Split Awards & Bid Protests in Acquisition

Acquisition Research Symposium

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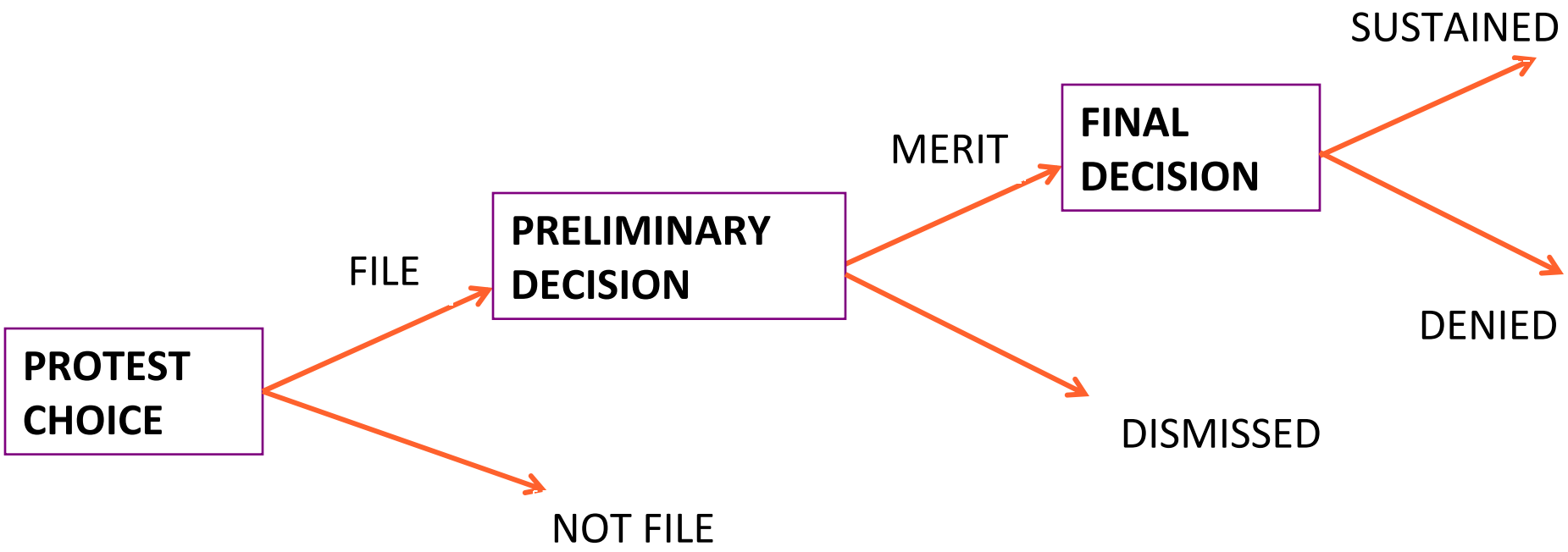
Managing Bid Protests

- Objective is not to minimize number of bid protests
- Protests may correct procurement mistakes:
  - Honest mistake: Limited information & bounded rationality
  - "Dishonest" mistake: Bias by procurement officials
- Objective is to "right size" number of protests
  - Encourage protests that correct (significant) mistakes
  - Discourage protests that don't make significant corrections
- What are DoD's "levers of control" for managing the number and nature of protests?

The Bid Protest Process



- Probability (Merit)
- Probability (Sustained/Merit)

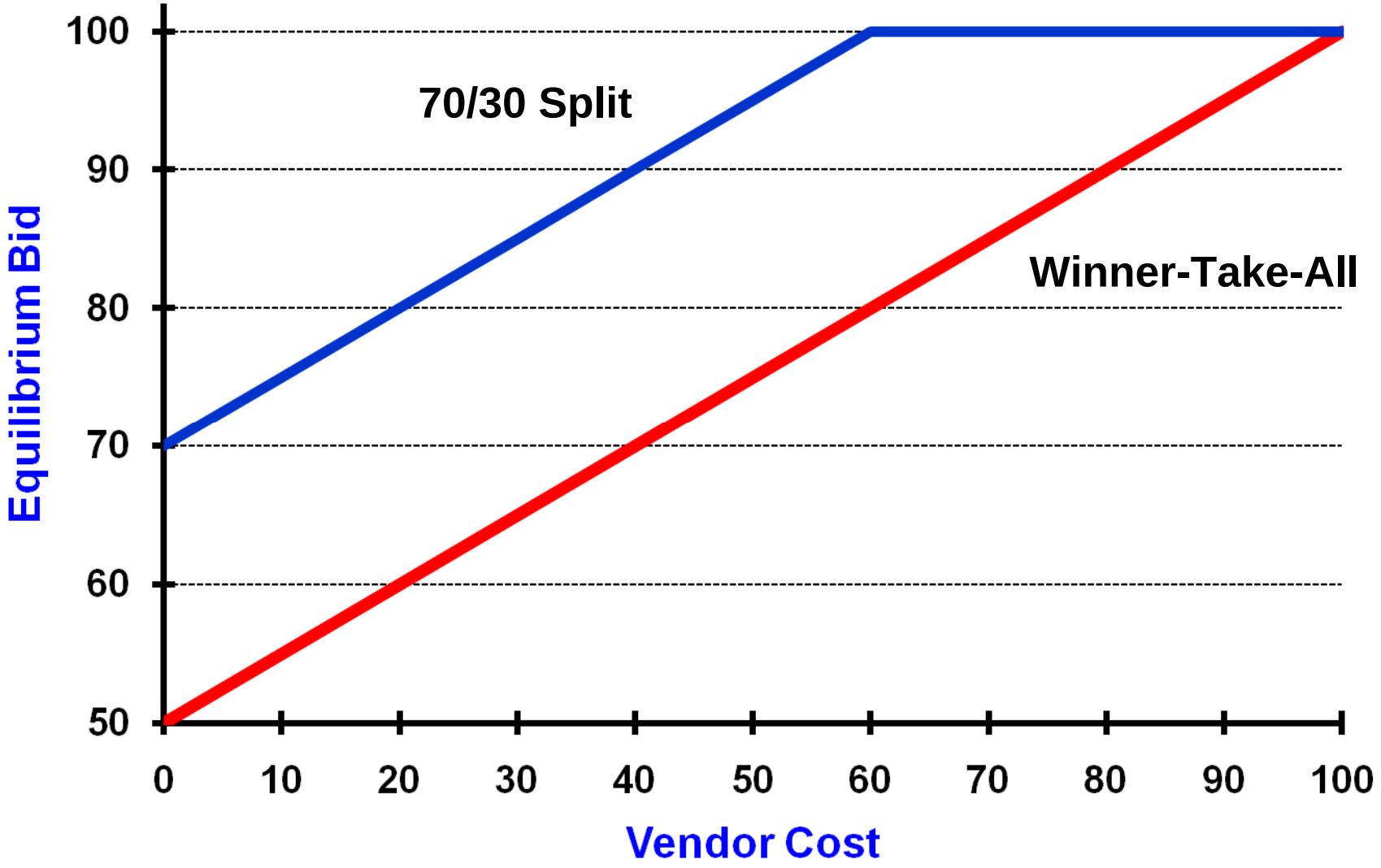
Managing Vendor Protest Incentives

- Profit from Protest
  - = Expected Benefits – Expected Costs
- Expected Benefits
  - = Prob (Merit)×Prob (Sustained | Merit)× **Added** Revenue
- Expected Costs
  - = Search & Information + Legal + Reputation + Opportunity Costs
- Levers of control?
  - – Influence expected benefits
  - – Influence expected costs
  - – Encourage “good” protests, discourage “bad” protests

Split-Awards to Manage Bid Protests

- Benefit of winning protest much larger under “winner-take-all” vs. split-award
  - Winner-take-all = 100% vs. 0%
  - Split-award ≈ 70% vs. 30%
- Raises “hurdle” to file protest
  - Expected benefit insufficient for “bad” protests?
  - Expected benefit sufficient for “good” protests?
- Key question: What is the right split?

The Problem with Fixed Splits



Simple Model: Two Sellers

Notation:

- P_L = Lower bid price
- P_H = Higher bid price
- Let $R = P_L / P_H$
  - $0 \leq R \leq 1$
- S_L = Share or split awarded low bidder
- S_H = Share or split awarded high bidder
  - $S_L + S_H = 1$
  - $0 \leq S_H \leq ½ \;\&\; ½ \leq S_L \leq 1$

Endogenous Split Award Function

Example Split Function:

- $S_H = \alpha R^{\beta}$
  - α = maximum share to low value bidder ($0 \leq \alpha \leq ½$)
  - $\beta \geq 0$
  - S_H is increasing in α & R
  - S_H is decreasing in β

DoD decision: What are the best α & β?

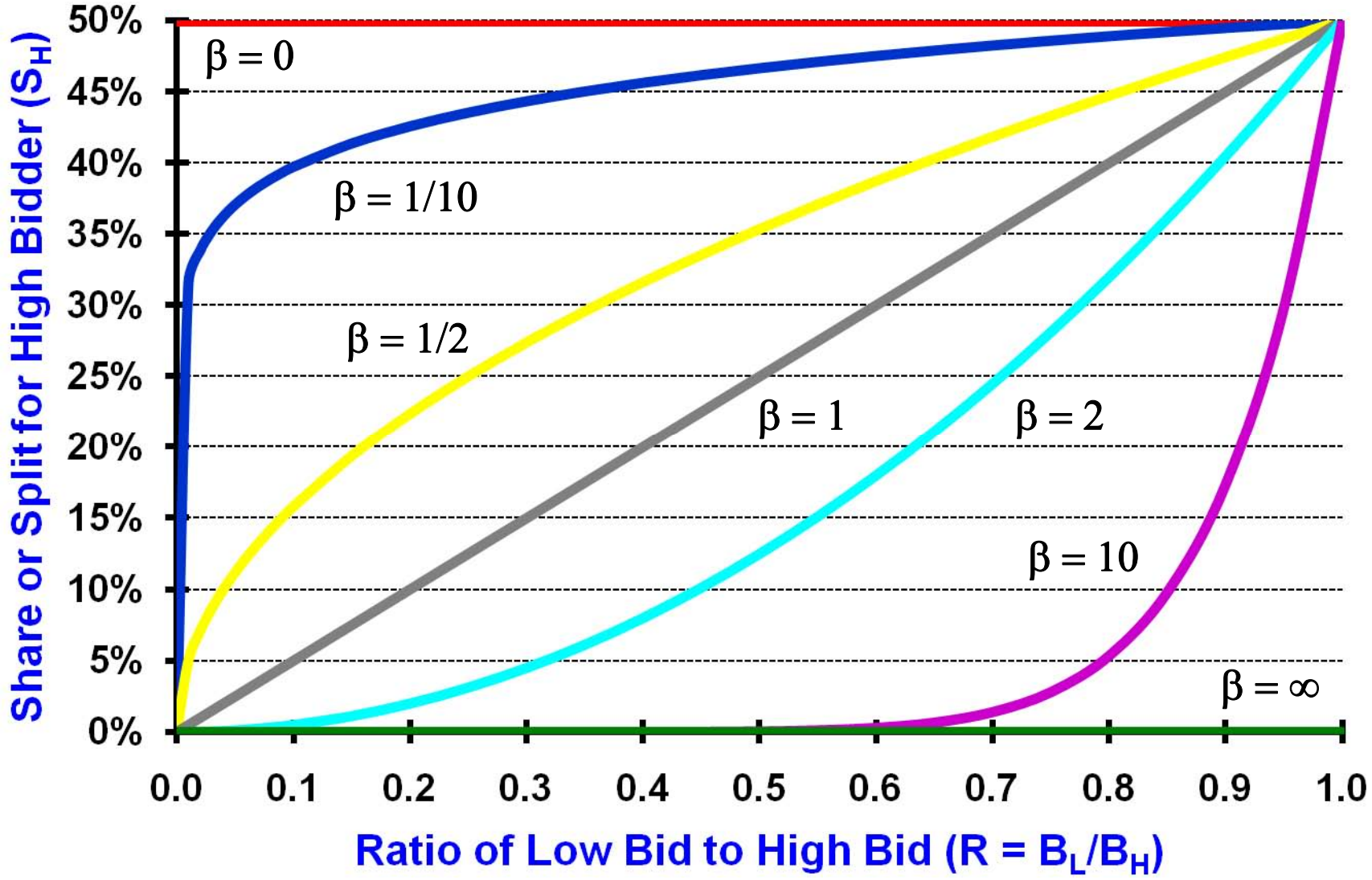
Split Award Scenarios with $S_H = \alpha R^{\beta}$

	$\beta = 0$	$0 < \beta < 1$	$\beta = 1$	$1 < \beta < \infty$	$\beta = \infty$
$\alpha = 0$	$S_H = 0$ Winner-Take-All	$S_H = 0$ Winner-Take-All	$S_H = 0$ Winner-Take-All	$S_H = 0$ Winner-Take-All	$S_H = 0$ Winner-Take-All
$0 < \alpha < ½$	$S_H = \alpha$ Fixed Split	$0 \le S_H \le \alpha$ $S_H > \alpha r$	$0 \le S_H \le \alpha$ $S_H = \alpha r$	$0 \le S_H \le \alpha$ $S_H < \alpha r$	$S_H = 0$ Winner-Take-All
$\alpha = ½$	$S_H = ½$ Even Split	$0 \le S_H \le ½$ $S_H > ½r$	$0 \le S_H \le ½$ $S_H = ½r$	$0 \le S_H \le ½$ $S_H < ½r$	$S_H = 0$ Winner-Take-All

Better for High Bidder
Worse for Low Bidder

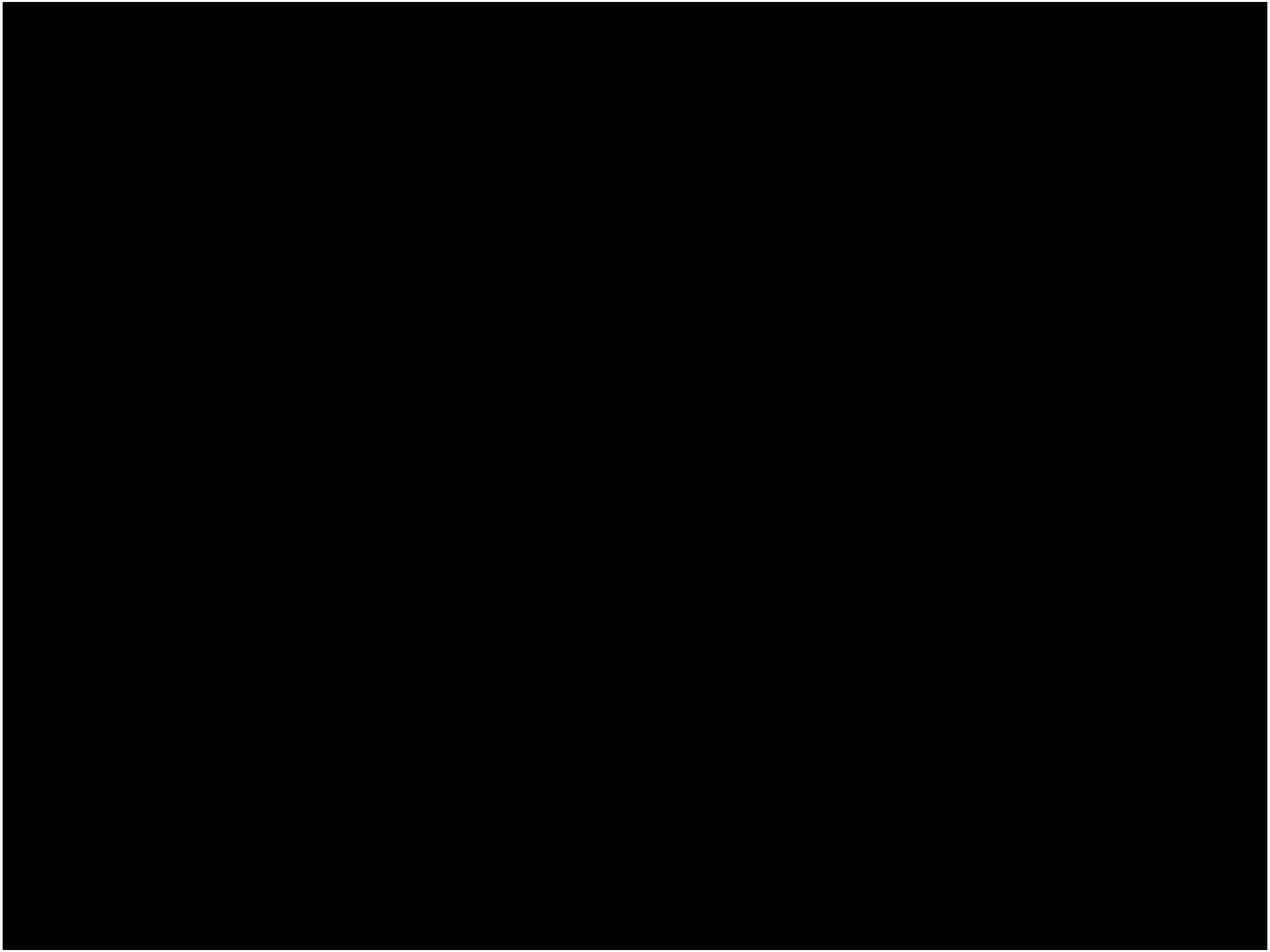
Worse for High Bidder
Better for Low Bidder

Split Award Scenarios with $S_H = \frac{1}{2}R^{\beta}$



Factors Under Investigation

- Imperfect information & error
- Dynamic/repeated procurement
- Learning/experience effects
- Pre-bid investment & innovation
- Economies of scale



Imperfect Information & Award Error

- Award error could arise from a number of sources:
  - Imperfect information about bids (price or quality)
  - Accidental error by buying agent
  - Buying agent bias
- For simplicity, we model the source of award error as imperfect information about seller bids

Imperfect Information & Award Error

- Without loss of generality, assume buyer knows P_H but has imperfect information about P_L
- Let $R = P_L / P_H$
  - $0 \leq R \leq 1$
- Let r = Buyer's estimate of R
  - $0 \leq r \leq 1$
- $r \sim B(N,R)$ Bernoulli?
  - Binomial with N draws & expected value R
  - Higher N $\Rightarrow$ more accurate estimate of R